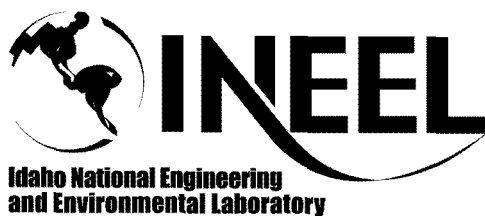


## **Engineering Design File**

PROJECT NO. 23833

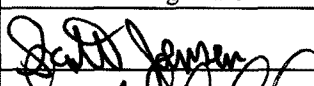
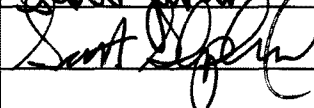
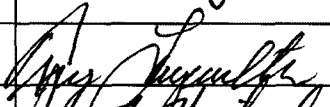
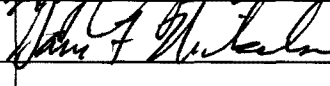
# **OU 7-13/14 In Situ Grouting Project Subsurface Disposal Area Site Conditions**



Form 412.14  
10/9/2003  
Rev. 05

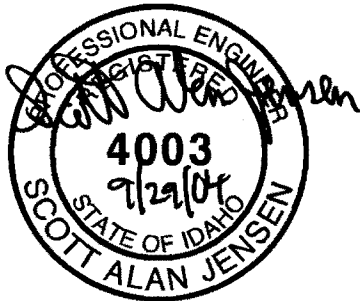
**OU 7-13/14 In Situ Grouting Project  
Subsurface Disposal Area Site Conditions**

EDF No.: 5147 EDF Rev. No.: 0 Project File No.: 23833

1. Title: <u>OU 7-13/14 In Situ Grouting Project Subsurface Disposal Area Site Conditions</u>				
2. Index Codes:				
		<u>WMF-700</u>	<u>Radioactive Waste</u>	
Building/Type	<u>Subsurface Disposal Area</u>	SSC ID <u>N/A</u>	Site Area <u>Management Complex</u>	
3. NPH Performance Category: _____ or <input checked="" type="checkbox"/> N/A				
4. EDF Safety Category: _____ or <input checked="" type="checkbox"/> N/A SCC Safety Category: <u>Grade</u> or <input checked="" type="checkbox"/> N/A				
5. Summary: This engineering design file provides the design parameter calculations for grout materials for the In Situ Grouting Project.				
6. Review (R) and Approval (A) and Acceptance (Ac) Signatures: (See instructions for definitions of terms and significance of signatures.)				
	R/A	Typed Name/Organization	Signature	Date
Performer/ Author	N/A	Scott Jensen, PE, 3K16		9/29/04
Technical Checker	R	Vondell Balls, PE, 3K16		9/29/04
Independent Peer Reviewer (if applicable)	R			
Approver	A	Tracy A. Langenwalter, 3K16		9/29/04
Requestor (if applicable)	Ac	David F. Nickelson, PE, 3F20		7/29/04
Doc. Control				
7. Distribution: (Name and Mail Stop)				
8. Does document contain sensitive unclassified information? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes, what category:				
9. Can document be externally distributed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
10. Uniform File Code: <u>6104</u> Disposition Authority: <u>ENV1-j-1</u> Cutoff at the end of the program or project. Destroy 75 years after Record Retention Period: <u>cutoff.</u>				
11. For QA Records Classification Only: <input type="checkbox"/> Lifetime <input checked="" type="checkbox"/> Nonpermanent <input type="checkbox"/> Permanent Item and activity to which the QA Record apply:				
12. NRC related? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				

**OU 7-13/14 In Situ Grouting Project**  
**Subsurface Disposal Area Site Conditions**

EDF No.: 5147 EDF Rev. No.: 0 Project File No.: 23833

1.	Title:	OU 7-13/14 In Situ Grouting Project Subsurface Disposal Area Site Conditions		
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	Building/Type	WMF-700	SSC ID	N/A
		Subsurface Disposal Area	Site Area	Radioactive Waste Management Complex
13.	Registered Professional Engineer's Stamp (if required)			
				

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**OU 7-13/14 In Situ Grouting Project**  
**Subsurface Disposal Area Site Conditions**

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## **ACRONYMS**

EDF	engineering design file
INEEL	Idaho National Engineering and Environmental Laboratory
ISG	in situ grouting
OU	Operable Unit
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area

**OU 7-13/14 In Situ Grouting Project**  
**Subsurface Disposal Area Site Conditions**

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# **OU 7-13/14 In Situ Grouting Project Subsurface Disposal Area Site Conditions**

## **1. PURPOSE**

This engineering design file (EDF) provides the design parameters for equipment and personnel access to the Subsurface Disposal Area (SDA) at the Idaho National Engineering and Environmental Laboratory's (INEEL's) Radioactive Waste Management Complex (RWMC) for the Operable Unit (OU) 7-13/14 In Situ Grouting (ISG) Project.

## **2. BACKGROUND**

Generally, low-level waste trenches and pits within the SDA at RWMC will be grouted to form a monolith totally encapsulating the waste. Transuranic pits and selected trench areas will be grouted with a wider spacing of columns sufficient to support a cap (see EDF-5028, "RWMC In Situ Grouting Project Foundation Grouting Study").

The low-level waste under consideration lies beneath an area of about 11.1 acres and occupies a volume of about 1,320,000 ft<sup>3</sup>. The transuranic pits and trenches are spread over an area of 15.4 acres and occupy a volume of about 2,330,000 ft<sup>3</sup>.

Equipment, vehicles, and personnel will be required to travel and work on the SDA road and, in some cases, on the surface of the pits and trenches. This EDF deals with some of the civil engineering design issues associated with the work and movement to and from the work area.

## **3. SCOPE**

This EDF is limited to presentation of the parameters that must be included in specifications for access to the SDA for the OU 7-13/14 ISG Project.

## **4. REQUIREMENTS (FUNCTIONAL, PERFORMANCE, AND TECHNICAL)**

The ISG Project requires that equipment, vehicles, and personnel travel to the work area on the SDA access roads, and that some personnel and equipment work on the surface of the trenches and pits.

## **5. SYSTEM CLASSIFICATIONS, CATEGORIZATIONS, AND DETERMINATIONS**

### **5.1 Safety Classification and Natural Phenomena Hazard Category**

The roads and drainage system within the SDA are safety category consumer grade. Natural phenomena are not directly applicable to the SDA roads and drainage system.



## **6. ASSUMPTIONS**

It is assumed that grouting will occur during a six-month period extending from late spring to early fall.

## **7. DESIGN CRITERIA**

### **7.1 Applicable Design Codes and Standards**

No design codes or standards are mandatory for the scope of this EDF, since no permanent changes to the existing roads or drainage system are currently proposed for the selected grouting alternative.

If modifications to the drainage system become necessary, they will be designed using the 25-year, 6-hour storm of 1.4 in. as a minimum as required by the Department of Energy Idaho Operations Office Architectural Engineering Standards.

If modifications to existing roadways are necessary, they will be designed using American Association of State Highway and Transportation Officials Standards. Access roads exterior to the SDA will have a large amount of truck traffic during some periods of the life of this project. Paving of these roads may be prudent, particularly if other RWMC projects also require all weather roadways. The State of Idaho Transportation Department, Division of Highways Standard Specifications for Highway Construction, will be used for upgrades to access roads that require paving.

### **7.2 System Design Requirements**

A storm water protection plan will be required to ensure that rain and snow will be properly routed from the SDA during grouting (see Project File 24148, "SDA Drainage Improvement Project").

The existing roads must be maintained during grouting. This includes grading and dust control activities. Application of a dust control palliative is recommended for roads with high traffic volume.

The grouting operations must coordinate access requirements with other SDA activities, such as waste retrieval and waste disposal.

### **7.3 Existing Site Conditions**

The project site is located in the SDA, west of the RWMC operations area at the INEEL. The site has been modified from its natural condition in several ways. The original site soils were mostly wind deposited silts on top of lava bedrock (i.e., basalt). Originally, the pits and trenches were excavated to or near basalt. Before filling, a soil layer was placed and evenly graded in areas with exposed basalt. Waste materials were placed and then covered with additional soil. During the backfilling, the void volume between the loose packed containers was filled with interstitial soil. Additional clayey silt soils were placed in some areas to provide shielding, to fill areas of subsidence, and to provide drainage for storm water. The covering soils are generally called overburden. Gravel has also been placed in various areas as pads for construction activities, temporary buildings and structures, equipment pads, and access roads.

A number of observation and sampling probes have been installed in areas of the SDA. These probes may be obstacles for grouting operations.

Various structures associated with vapor extraction and past retrieval activities also exist in the SDA. These structures are shown on the SDA plot plan included in Appendix A of this EDF. These structures will have to be moved or demolished if grouting is to occur in the areas currently occupied by them.

Rain and snow are the only natural sources of water within the SDA. Localized runoff within the SDA is controlled by an existing internal drainage system. Surface water runoff discharges through a concrete storm water catch basin into the main RWMC drainage channel along Adams Boulevard. The ISG Project must include provisions to retain and protect the existing drainage system.

The existing SDA access roads are gravel and may not be accessible by all types of vehicles during the entire year. Winter conditions or extremely wet conditions, such as may occur during the spring thaw, will make access for heavy trucks, trailers, or other equipment difficult. Current plans are to limit grouting to the time of year when conditions will not be adverse. Grading and dust control will be required for roads that have heavy traffic.

The depth of the existing overburden varies from a minimum of approximately 2 ft to 6 or more ft. The overburden material is generally a clayey silt material that can be very hard and stable or very soft and unstable, depending on its moisture content. Some areas also contain sand or gravel that provide a better base for vehicle and equipment traffic. The capability of the overburden materials to support equipment and vehicles is difficult to predict because of the variation in overburden depth and changes in surface moisture content due to weather conditions.

The International Building Code generally limits the allowable bearing capacity of soils of this type to 1,500 lb psf. This is a good lower limit for bearing capacity in most areas and for most conditions. An engineering analysis of the bearing capabilities could be performed to establish bearing capacity. However, the variations in the assumptions and conditions that would bound the analysis would produce a wide range of possible results. Past experience has shown that vehicles with much higher ground pressures can safely operate on the overburden when conditions are ideal. However, in areas with low overburden depth and during wet conditions, there is the possibility of a localized subsidence or the potential for a vehicle to become stuck in the mud. Equipment that must be located on the trenches and pits should be tracked or have large enough tires to provide similar ground pressures as tracked vehicles. Equipment or vehicles with ground pressures in excess of 2,000 psf should be limited to access roads or be provided with mats or similar means of reducing ground pressure. This is particularly true in areas with low overburden depth or when weather conditions are adverse.

## **8. RISKS**

The major risks for access to the SDA are weather related. If the weather produces wet conditions, then operations will become more difficult, and may require the use of mats or similar features to reduce the possibility of shutdowns caused by equipment having to work in muddy conditions.

## **9. LOGISTICS SUPPORT**

The project will require that the SDA access roads and drainage system be maintained.

## **10. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS**

Periodic grading and dust control is required on gravel access roads receiving significant traffic during grouting activities. Application of a dust control palliative is recommended on these roads to reduce the time spent on this effort.

The ISG Project should limit equipment and personnel working on the pit and trench surfaces to the extent practical. Equipment that must operate on these surfaces should have ground pressures of 2,000 psf or lower. Mats, platforms, or other means of reducing ground pressure should be provided for equipment with ground pressures exceeding this value. During wet conditions or where overburden depths are less than 3 ft, ground pressures should be 1,500 psf or lower.

Surface drainage conditions will need to be maintained during grouting. As soon as the grout will support equipment, the surface should be sloped to drain water to the existing ditches. The ISG Project may be required to replace or extend existing culverts if the elevation changes in areas near the culverts.

## **11. REFERENCES**

American Association of State Highway and Transportation Officials Standards.

Department of Energy Idaho Operations Office Architectural Engineering Standards.

EDF-5028, "RWMC In Situ Grouting Project Foundation Grouting Study."

International Building Code.

Project File 24148, "SDA Drainage Improvement Project."

## **Appendix A**

### **Figures**

**OU 7-13/14 In Situ Grouting Project**  
**Subsurface Disposal Area Site Conditions**

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## Appendix A

### Figures

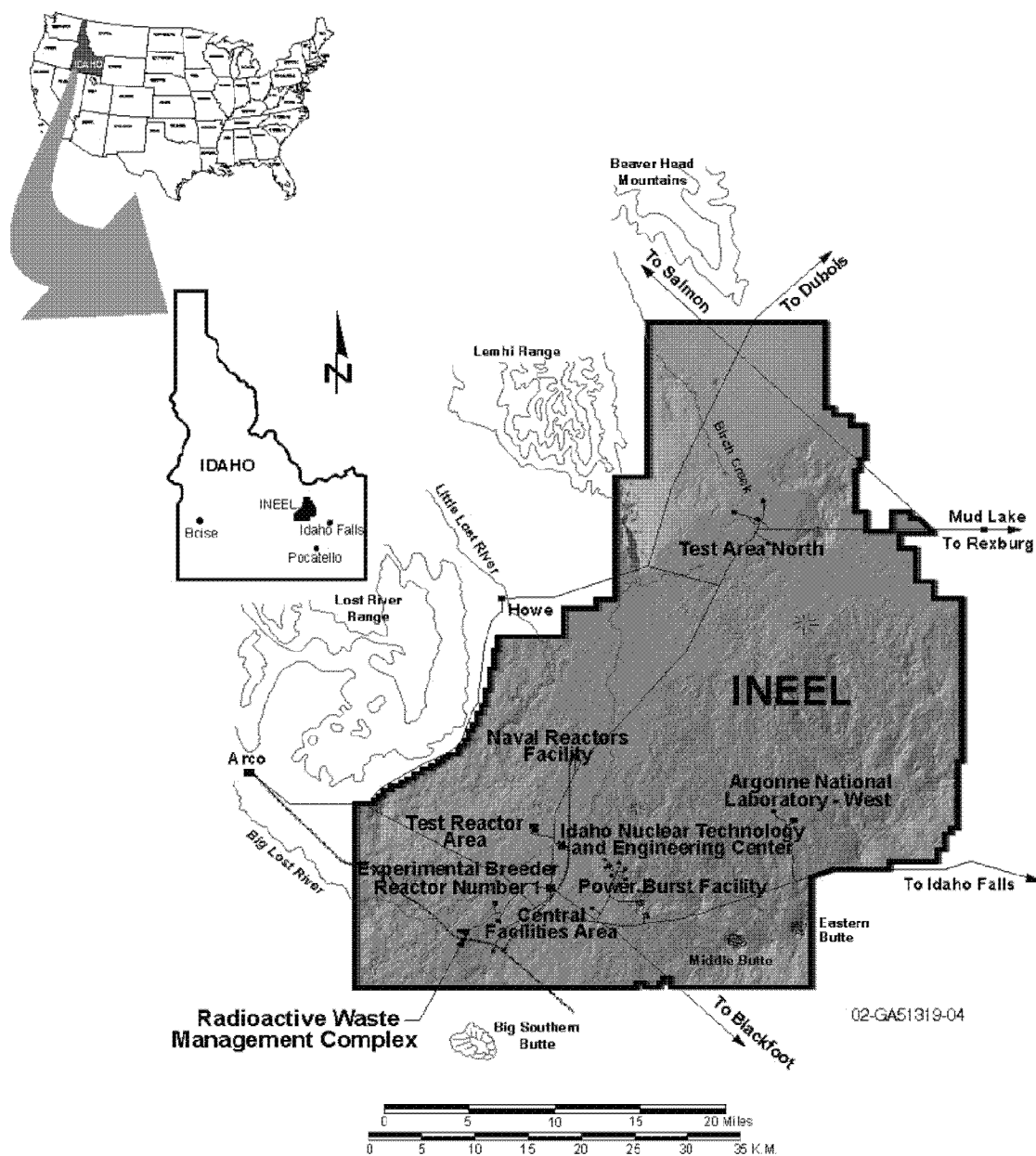
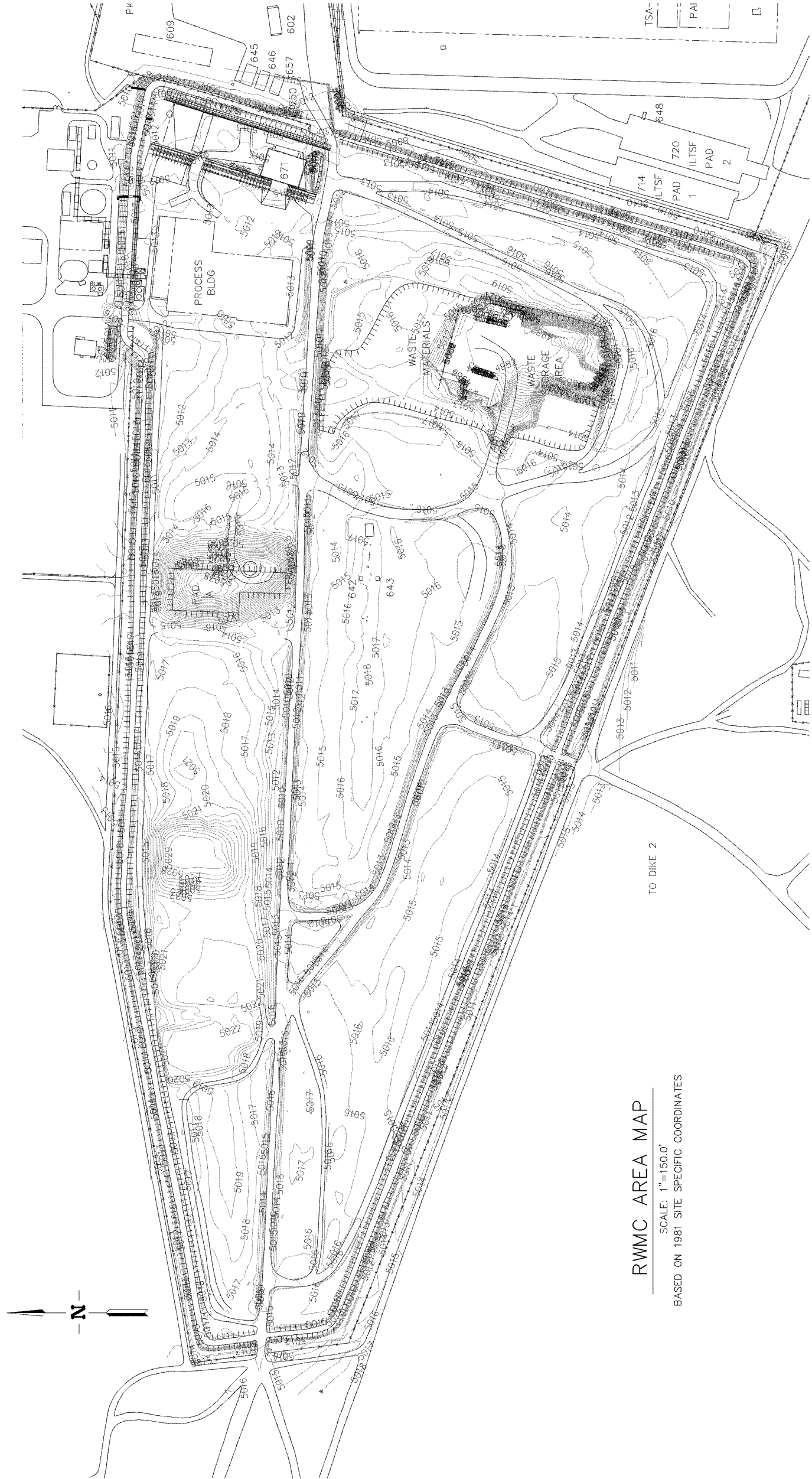


Figure 1. Map of the Idaho National Engineering and Environmental Laboratory, showing locations of the Radioactive Waste Management Complex and other major Site facilities.

OU 7-13/14 In Situ Grouting Project  
Subsurface Disposal Area Site Conditions

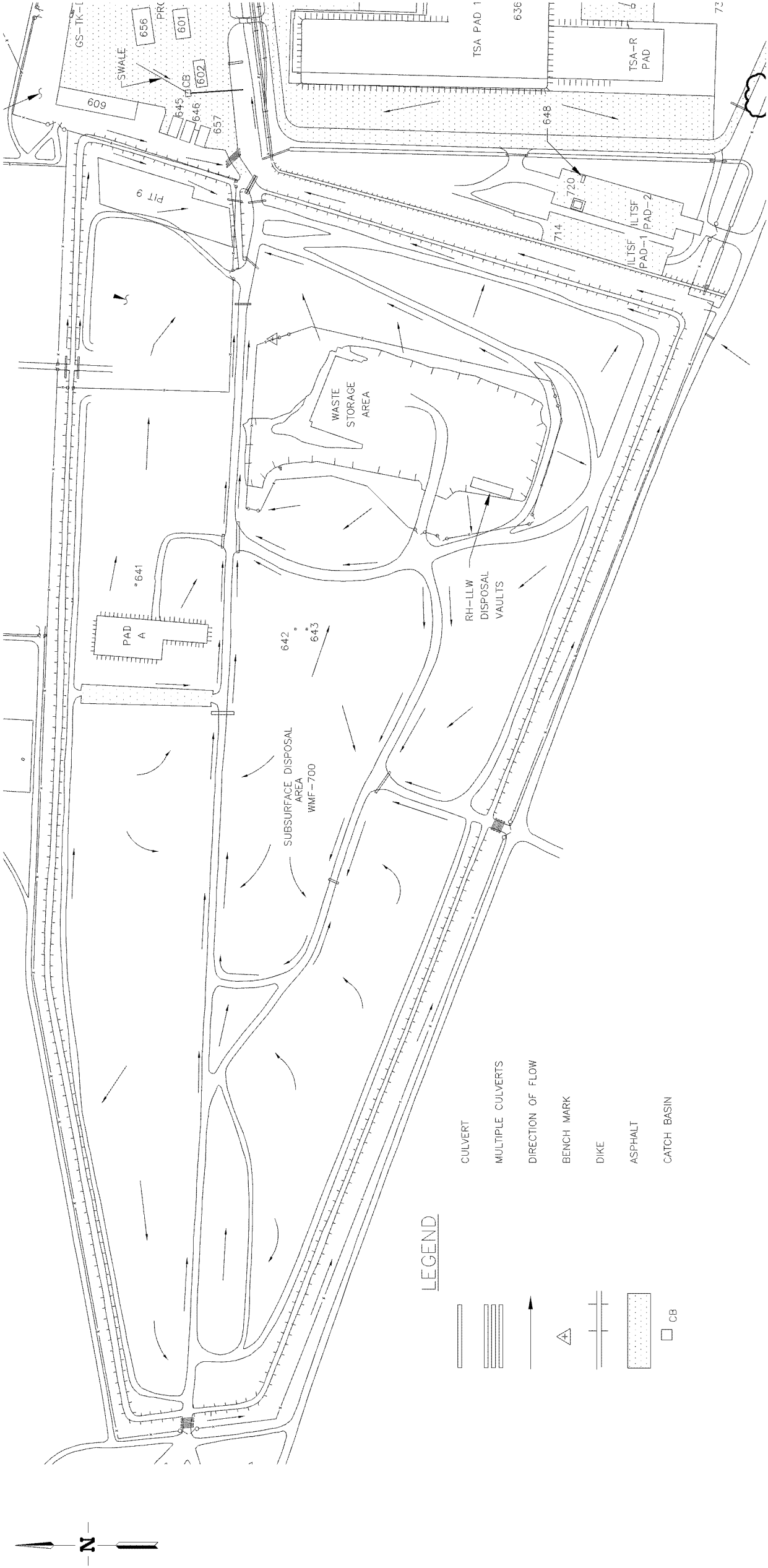
Engineering Design  
File

Identifier: EDF-5147  
Revision: 0  
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RWMC AREA MAP

SCALE: 1"=150.0'  
BASED ON 1981 SITE SPECIFIC COORDINATES



CULVERT AND DITCH DRAINAGE PLAN

SCALE: 1"=150.0'